



Ground Mounting Systems

Installation Guide and General Instructions

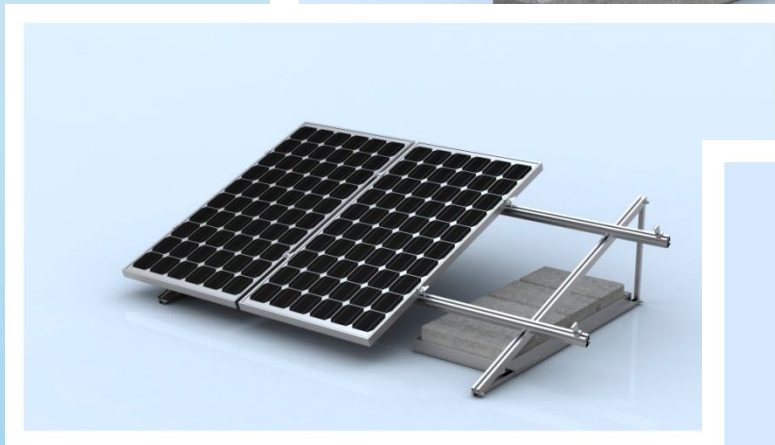
KM-F Series – Concrete Foundations

KM-S Series – Ground Screw in System

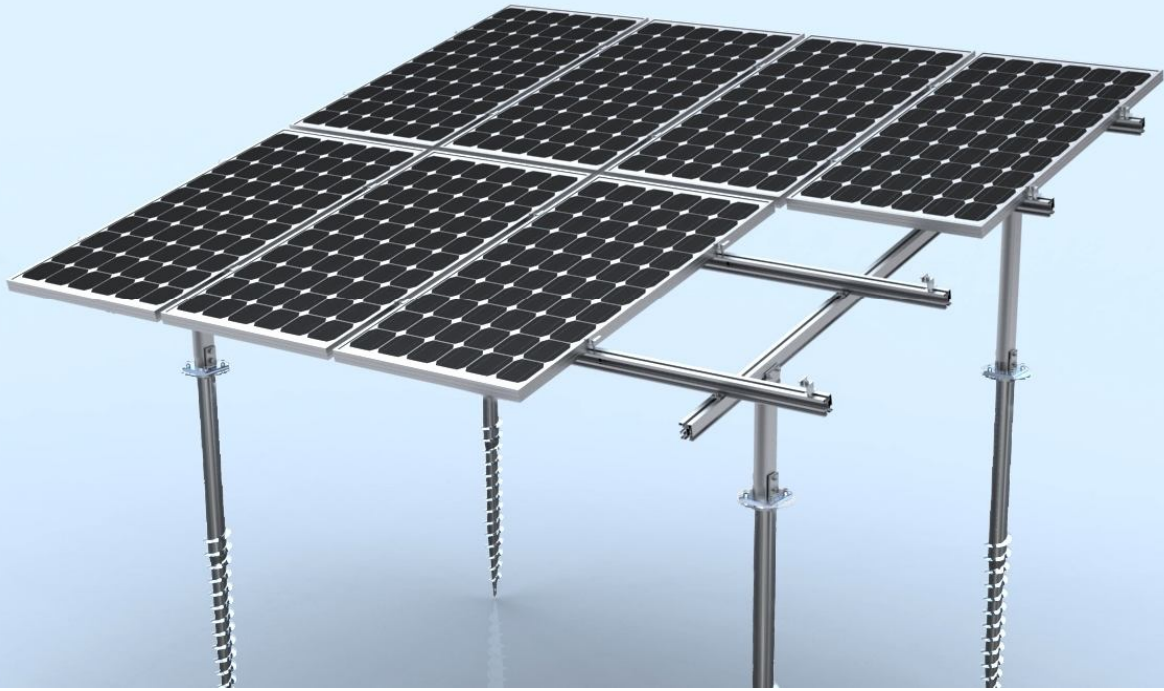
KM-D Series – Driven Foundations

KM-W – Ballast Foundations

KM-RF & KM-NRF – Triangular Tilt Frame



STRENGTH CREATES VALUE



Thank you for choosing KNE as your supplier of quality racking and mounting solutions.

The following instruction manual and its associated diagrams are deemed as recommendations to assist you in the installation of KNE's ground based solar mounting solutions in a systematic manner.

In cases where special or exceptional conditions exist, you are strongly advised to consult the professional advice and guidance of the relevant government authorities or an engineer's opinion to ensure compliance is achieved.

Contents

A About Ground Mounting	Page	1	About Foundations
	Page	1	Tips and Recommendations
	Page	1	General Diagram
B Safety	Page	2	General Warnings and Safety Precautions
C KM-F Series – Concrete Foundations	Page	3	Specifications
	Page	3	System Components
	Page	4	Installation – KM-F Series
	Page	4	1.1 Installation Step 1 – Bracket Mounting (Fixed & Adjustable)
	Page	5	1.2 Column and Connecting Nodes
	Page	7	1.3 Rail Superstructure
D KM-S Series – Ground Screw Foundations	Page	9	Specifications
	Page	9	System Components
	Page	10	Installation – KM-S Series
	Page	10	1.1 Installation Step 1 – Screw Piling
	Page	10	1.2 Installation Step 2 – Bracket to Screw Pile Mounting
	Page	11	1.3 Installation Step 3 – Column and Connecting Nodes
E KM-D Series – Driven Foundations	Page	14	Specifications
	Page	14	System Components
	Page	15	Installation – KM-D Series
	Page	15	1.1 Installation Step 1 – Pile Driving
	Page	15	1.2 Installation Step 2 – Connecting Nodes
	Page	17	1.3 Installation Step 3 – Rail Superstructure
F Triangular Tilt Frame Systems KM-RF/KM-NRF/KM-W Series	Page	18	Specifications
	Page	18	System Components
	Page	20	Installation – KM-RF/NRF & KM-W Series
	Page	20	1.1 Installation Step 1 – Triangular Frame Assembly
	Page	20	1.2 Installation Step 2 – Ground Fixing
	Page	21	1.3 Installation Step 3 – Rail Mounting
G Splice Connection and Panel Mounting	Page	24	1.4 Installation Step 4 – Ballast Tray Mounting
	Page	24	Splice Connecting
H General Information	Page	25	Panel Mounting
	Page	27	Maintenance
	Page	28	Limited Warranty
	Page	28	Liability

A. About Ground Mounting

About Foundations

When installing solar panels in the open ground, consideration of the terrain must be taken into account, and a suitable foundation type must be used. There are different options for different ground types and different soil conditions.

KNE offers products for a variety of foundation types, including anchoring onto concrete cast foundations, use of ground screws, use of driven piles, and ballast trays. Please note that the determination, dimensioning, and laying out of the foundations must be performed by a foundation specialist.

Tips and Recommendations

>> Consider the loose preassembly of the columns and beam rails into free standing frames before installing onto the column brackets that are anchored onto the foundations. Once all the loosely connected free standing frames are screwed onto the column brackets, you may still make any necessary adjustments before securing the structure.

>> Dimensioning and spacing of the mounting system, including the distance between columns, module tilt angles, row set ups, and distance between the rows need to be designed by qualified engineering experts, with consideration of the conditions of the specific installation site.

General Diagram

A: Column brackets –
Attached to the
foundation

B: Columns

C: Beam rail

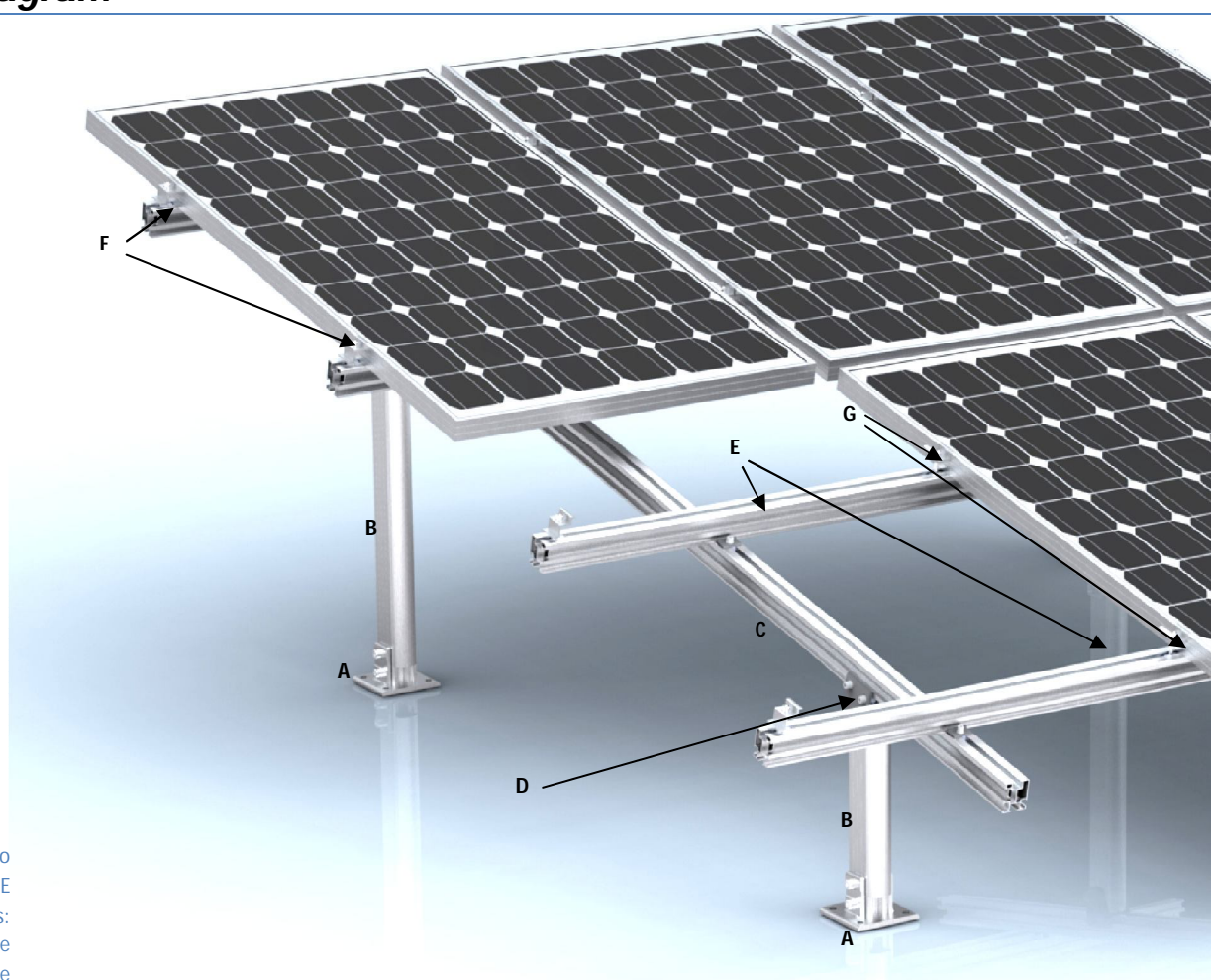
D: Connecting node

B+C+D: Free standing
frames

E: Rail superstructure

F: End clamps

G: Mid clamps



Note: The diagram to
the right applies to KNE
mounting systems:
KM-F: concrete
KM-S: screw pile

B. Safety

– General Warnings and Safety Precautions

Please read all safety instructions and information prior to the commencement of any installation work. Failure to comply with warning instructions outlined below may result in serious injuries and/or damage.

Adhere to the following instructions and warnings carefully:



Danger



Fall Hazard

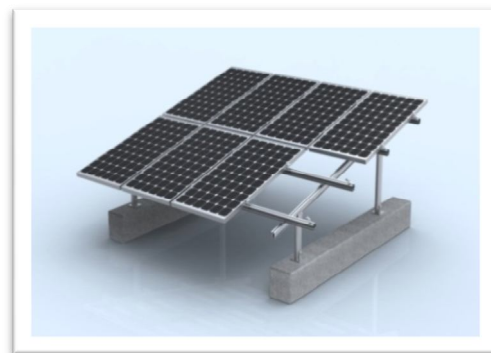


Electricity

- The installation of mounting and racking systems on is a potentially dangerous procedure and should only be attempted by qualified and licensed tradespersons.
- Observe all local and national code requirements for the prevention of accidents, especially versions that supersede this installation guide.
- Your safety ALWAYS comes first; do not place your fellow tradespersons or yourself in ANY unnecessary risk.
- Be alert and only install in fine weather conditions. Do not attempt to install in windy conditions, dust storms, rain/showers, intense heat, etc.
- Ensure all construction work has been approved and is compliant with local government rules and regulations and all necessary permits are obtained. The relevant regulation and technical standards of the location where the installation takes place must be observed.
- All checks must be conducted to ensure all electrical components and systems are correctly grounded and any grid tied connections are compliant with local electricity generation rules.
- Ensure that the mounting system design and the foundation to be installed can bear the installation site's wind and snow loads.
- KNE's Mounting Systems are designed to be installed easily. None of the components require excessive force/stress/strain. Please refer to the user manual if these are encountered.
- Do not in any way or form, modify any of the rails, clamps, hooks, etc. These components have been designed to work as manufactured. Modifying these components may compromise its structural integrity/performance.
- Use only certified and approved KNE components and spare parts, failure to do so may result in unsafe installations.
- Ensure all screw connections are securely fastened.
- Protect cables installed in the open against weather elements, UV light and physical damage.
- Any dimensioning and laying of foundations is to be carried out by a specialist contractor.
- Type and size of foundation types depend on soil types and each of these cases must be tailored for each project.
- Observe the safety instructions provided with other system components.

C. KM-F Series – Concrete Foundations

Adjustable and versatile, the KM-F series of KNE's flat ground racking systems is a designed and engineered solution for flat based roofing and ground concrete installations. The KM-F series features an adjustable tilt enabling the optimization of sunlight exposure regardless of location. The KM-F series can be fixed to the ground via concrete blocks, concrete encased brackets or with the use of anchor bolts

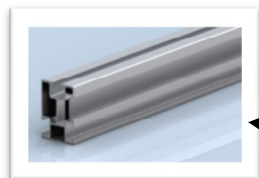


Specifications

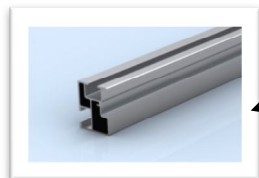
KM F Series - Concrete Foundations	
Installation Type	Ground Fixed (Mounting Brackets/Bolt Fixing)
PV Panel Type	Framed / Frameless
Panel Orientation	Portrait
Design Wind Speed	42 m/s (151km/h or 94 mph)
Design Snow Speed	0.735 kN/m ²
Material Type	Aluminium Alloys
Warranty	15 Years Structural Warranty
Approved Standards	AS/NZS 1170, USA, European Standards
Surface Finish	AMMA, ASCA and BS Standards

System Components

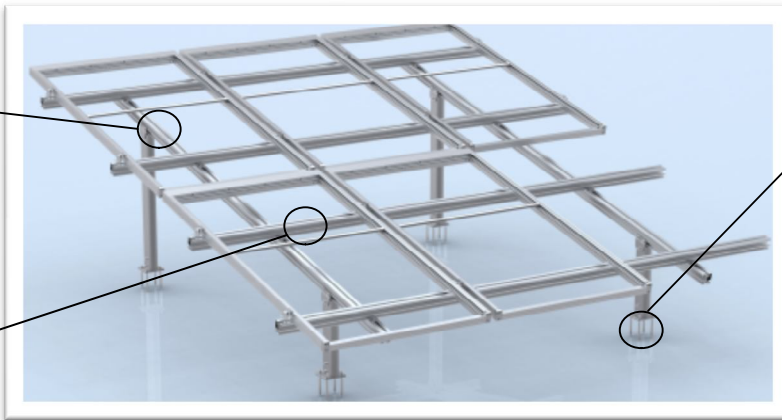
Rails and Column Brackets



Beam Rails
KR-M6



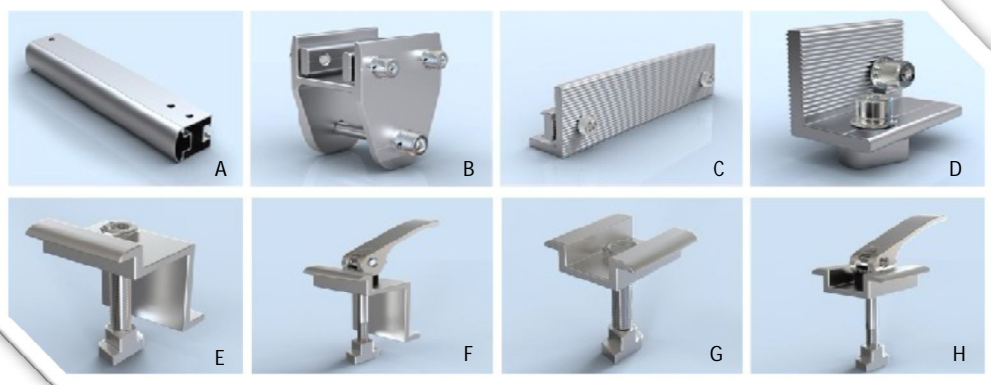
Joist Rails
KR-M5



Fixed Column Bracket
AS-H8



Adjustable Column Bracket
(Optional Variation)
AS-S9



Associated Rail Components

- A - Structural Column AL-50
- B - Beam to Column Connecting Node LC-S12
- C - Splice Connector SC-R19
- D - Rail Intersection Clamp RC-L20
- E - Version 1 End Clamp
- F - Version 2 Quick Mount End Clamp
- G - Version 1 Mid Clamp
- H - Version 2 Quick Mount Mid Clamp

Installation – KM-F Series

Overview:

Prior to the installation of the racking system, please ensure you have planned out the correct areas and location of the intended solar PV installation and that all measurements are as per your original plan. The KM-F Series design is based on the bolting of column brackets to concrete ballast blocks or onto existing concrete piled foundations and hence these concrete structures must be compliant with all necessary load bearing capacities and limit states as per engineer's drawings and calculations. The installation of the KM-F Series will be conducted with the following steps:

1. Bracket Mounting
2. Column, Beam Rails and Connecting Nodes
3. Rail Superstructure
4. Splice Connection
5. Panel Mounting

1.1 Installation Step 1 – Bracket Mounting (Fixed & Adjustable)

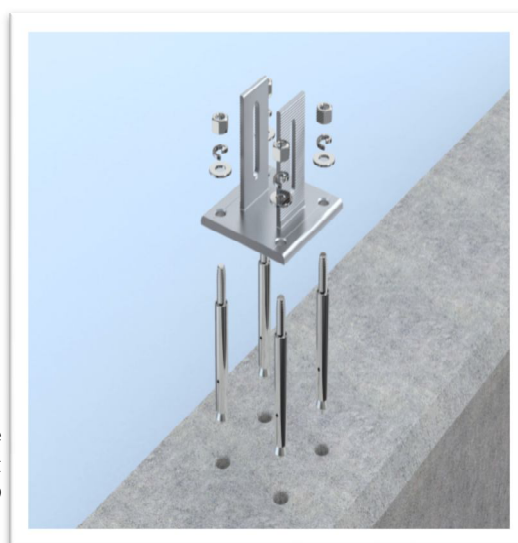
- 1.1.1 Once you have prepared the concrete foundations on the installation site, visually inspect the concrete mounting positions of where you intend to fasten and secure the column bracket and ensure this area is free of any cracks, concrete flaking or any other conditions which may compromise the structural integrity of the racking system.

Mark down all mounting positions and recheck all measurements to ensure alignment.

- 1.1.2 Begin at one of the column mounting bracket positions, mark down the drilling positions and drill 4 x 10 mm holes 100mm deep into the concrete. Insert the sleeve anchor bolts into these holes and fasten the column mounting bracket into position with the associated nut and washer assembly.



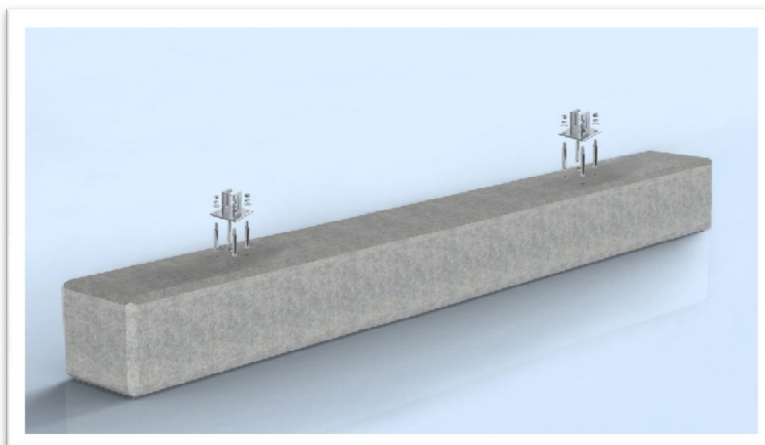
Fixed
Column Bracket
AS-H8



Adjustable
Column Bracket
AS-S9

- 1.1.3 Repeat this same procedure at the mounting position directly in line with the newly installed bracket as per the below diagram and ensure your measurements are correct.

- 1.1.4 Repeat the above the steps for all remaining mounting brackets whilst continually checking measurements and alignment.

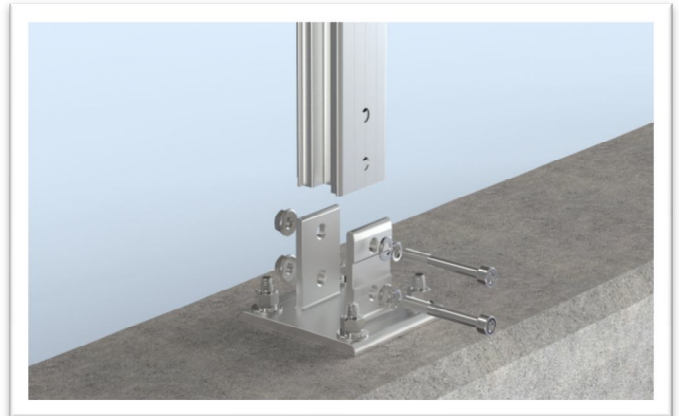


1.2 Installation Step 2 – Columns, Beam Rails and Connecting Nodes

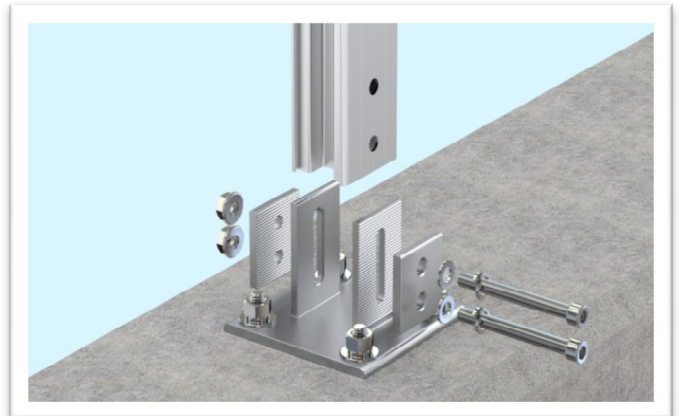
>> *Tip: Consider the loose preassembly of the columns and beam rails into free standing frames before installing onto the column brackets that are anchored onto the foundations. Once all the loosely connected free standing frames are screwed onto the column brackets, you may still make any necessary adjustments before securing the structure.*

The KM-F Series can be installed with an adjustable column bracket allowing for a variable tilt angle, the following instructions will guide you through the installation of columns onto an adjustable and fixed tilt column bracket.

- 1.2.1 **Fixed Column Bracket** – With the column mounting brackets in place, the structural columns can be inserted into the mounting brackets and fastened. Align the mounting holes of the column with the ground bracket and insert the two fastening bolts. Check the orientation and level of the column with a spirit level before fastening the two bolts.



- 1.2.2 **Adjustable Column Bracket** – Measure and mark your intended height of the column and attach one of the side fixing plates onto the column mounting bracket corresponding to the column's height and ensuring the teeth are correctly aligned.



- 1.2.3 Lower the column into the bracket to this predetermined height and insert one of the two fastening bolts with the washer through the side fixing plate and column onto the other end where the second side fixing plate will need to be attached.
- 1.2.4 Loosely attach these together with the associated nut of the bolt. Upon checking the level and height measurements, insert the second bolt and fasten both nuts.
- 1.2.5 Repeat the above steps for remaining mounting positions.
- 1.2.6 **Connecting Nodes and Beam Rails** – The connecting node must first be attached to the KR-M6 Beam Rail before mounting onto the columns. Slide the connecting node's anchor points into the KR-M6 Beam Rail's dual slots as per the below diagram and fasten the two screw points to fix into position as per your plan.



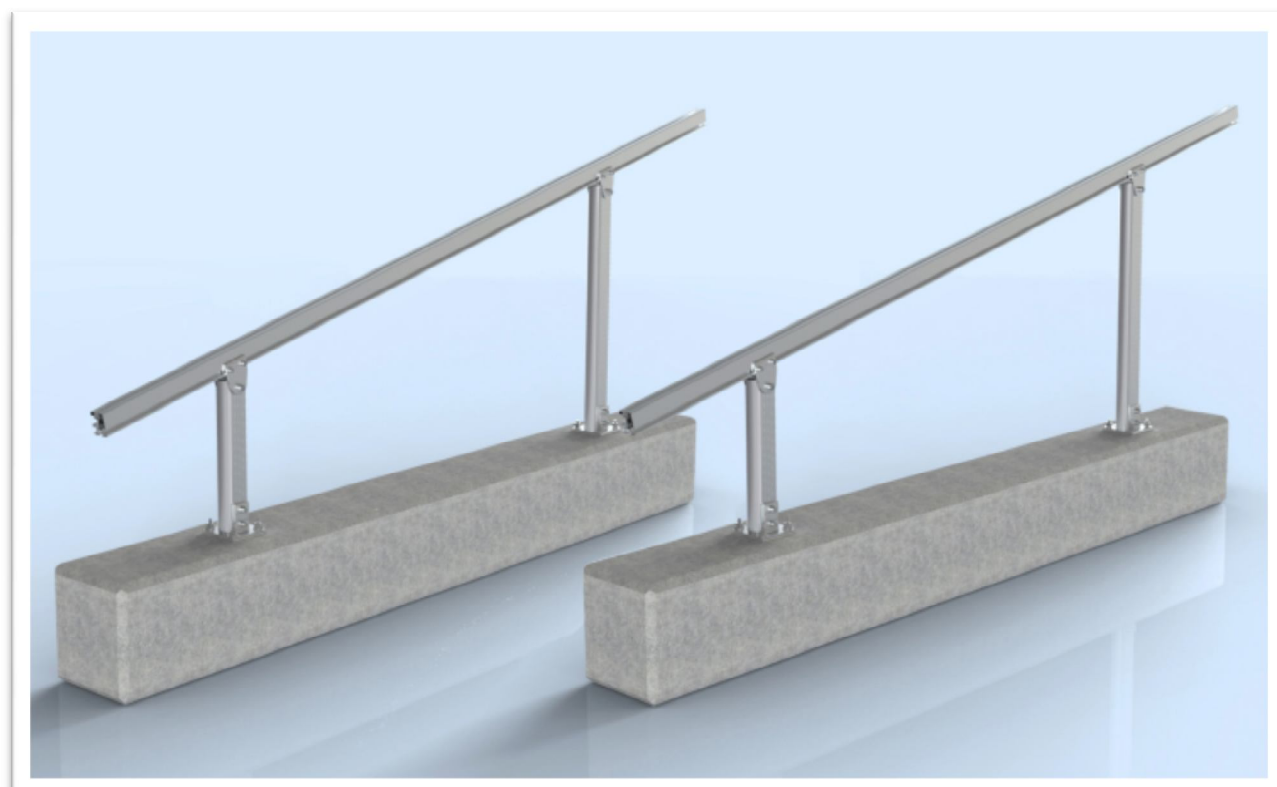


1.2.7 Connecting Nodes and Beam Rails (cont'd) – The connecting node attaches to the columns via a pin jointed bolt as per the below diagram:



1.2.8 Connect both connecting joints to the associated columns to complete the first set of free standing frames.

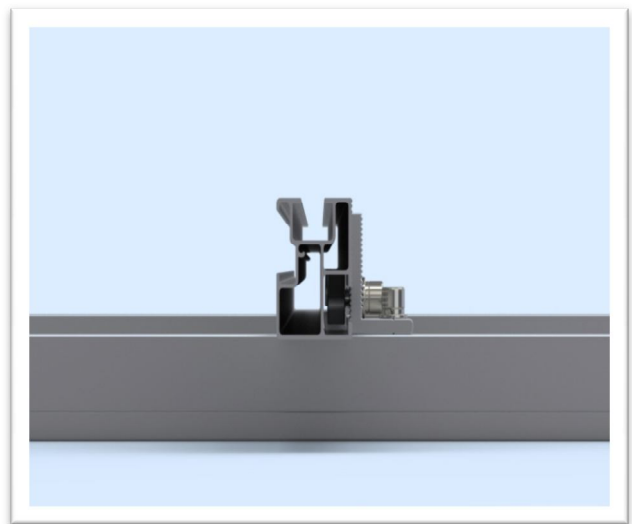
1.2.9 Repeat the above steps to complete all remaining free standing frames.



1.3 *Installation Step 3 – Rail Superstructure*

The KM-F Series utilises the KR-M5 Rail as the main component rail in mounting the associated solar panels. These KR-M5 rail lengths are in turn connected to the KR-M6 beam rails which are connected to the columns. Connecting the KR-M5 and KR-M6 rails will be the Rail Intersection Clamp RC-L20.

- 1.3.1 A pair of KR-M5 rails is required for each row of PV panels. The KM-F series is designed to support four parallel KR-M5 rails, or two rows of PV panels. At each of the intersections between the KR-M5 and KR-M6 rails an intersection clamp (RC-L20) is required.
- 1.3.2 Repeat this step for all intersections and ensure the clamps are flush fit when tightened.

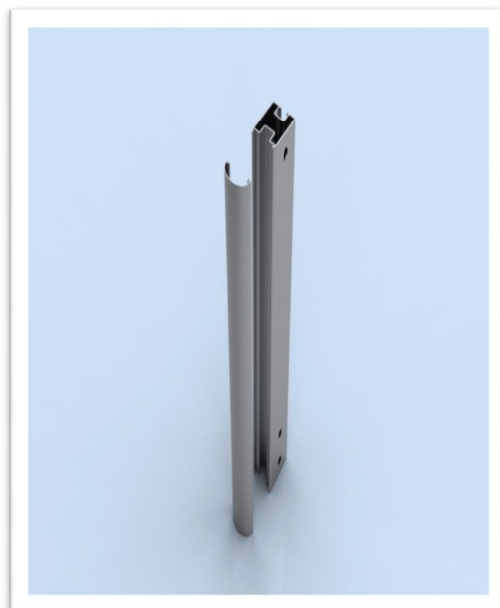


- 1.3.3 Your main super structure should now be complete and ready for panel mounting.

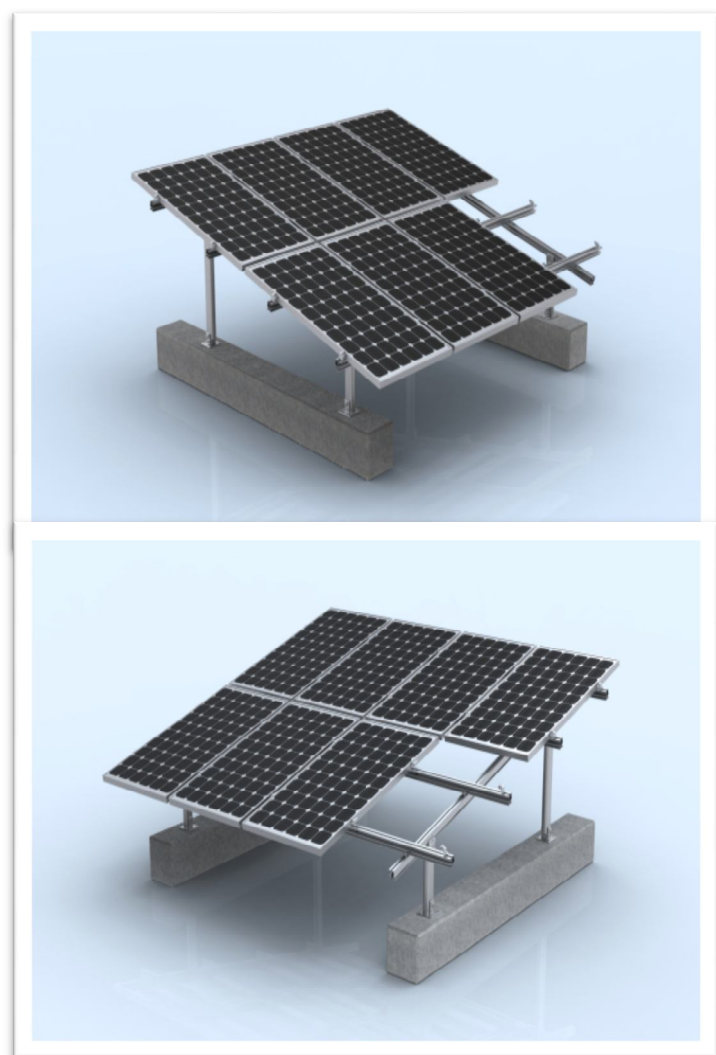


- 1.4 *In cases where an extended rail length is used, please refer to page 26 for the installation of a splice connector.*
- 1.5 *Please refer to Page 27 for panel mounting onto KR-M5 rails.*

The AL-50 structural column features a removal cover for the running of any necessary electrical cabling to the ground.



Overview Images

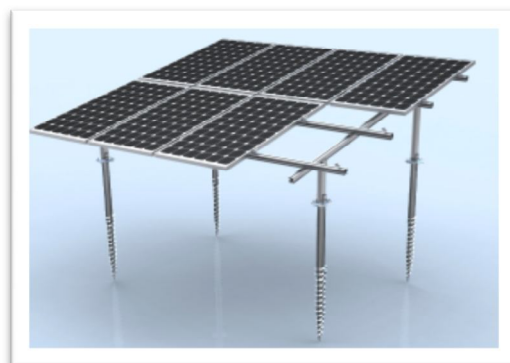


D. KM-S Series – Ground Screw Foundations

Where foundation costs and installation times are a factor, KNE's Ground Based Screw in System (KM-S) is your answer. Featuring a direct burrow drilling screw, this installation method is ideal for most soil types and provides a quick alternate solution to concreting.

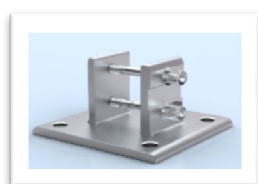
Specifications

KM-S Series - Ground Screw Foundations	
Installation Type	Ground Fixed (Screw Pile + Mounting Brackets)
PV Panel Type	Framed / Frameless
Panel Orientation	Portrait Orientation
Design Wind Speed	42 m/s (151km/h or 94 mph)
Design Snow Speed	0.735 kN/m ²
Material Type	Aluminium Alloys, Galvanised Steel
Warranty	15 Years Structural Warranty
Approved Standards	AS/NZS 1170, USA, European Standards
Surface Finish	AMMA, ASCA and BS Standards



System Components

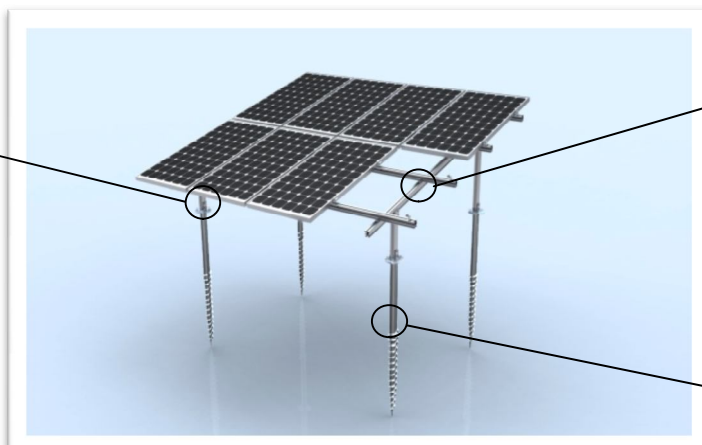
Rails and Column Brackets



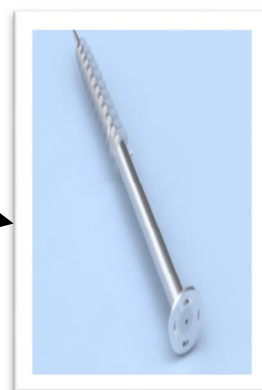
Fixed Column Bracket
AS-H8



Adjustable Column Bracket
(Optional Variation)
AS-S9

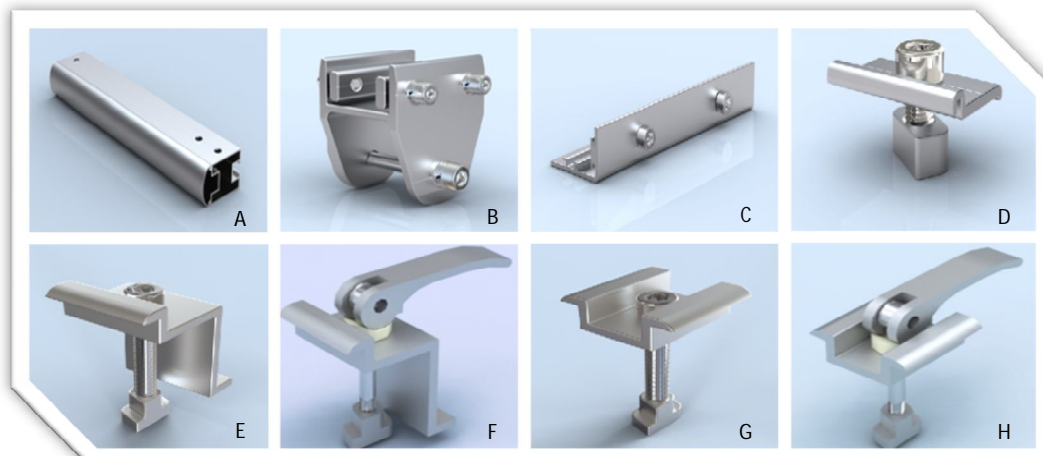


Beam & Joist
Rails KR-M6



Foundation Screw
GSF7616

Associated Rail Components



- A - Structural Column AL-50
- B - Beam to Column Connecting Node LC-S12
- C - Splice Connector SC-R5
- D - Rail Intersection Clamp RC-S4
- E - Version 1 End Clamp
- F - Version 2 Quick Mount End Clamp
- G - Version 1 Mid Clamp
- H - Version 2 Quick Mount Mid Clamp

Installation – KM-S Series

Overview:

Prior to the installation of the racking system, please ensure you have planned out the correct areas and location of the intended solar PV installation and that all measurements are as per your original plan. KNE's KM-S Series is based on the use of ground screws as foundations and must be installed into the ground with the use of the correct rotary drilling machines and driving attachments. The installation of the KM-S Series will be conducted with the following steps:

1. Screw Piling
2. Bracket to Screw Pile Mounting
3. Column and Connecting Nodes
4. Rail Superstructure
5. Splice Connection
6. Panel Mounting

1.1 Installation Step 1 – Screw Piling

1.1.1 Prior to the installation of the screw piles, you must have plan of your intended locations of the screw piles marked out in your field/assigned area. You must also ensure your piling contractor is a qualified operator of the necessary drilling/excavator machinery. *Refer to About Foundations part of the installation guide, page 1.*

1.1.2 When drilling the screw pile into the ground, leave approximately 100 mm protruding from the top.



1.2 Installation Step 2 – Bracket to Screw Pile Mounting

The KM-S Series can be installed with an adjustable column bracket allowing for a variable tilt angle, the following instructions will guide you through the installation of an adjustable and fixed tilt column brackets.



Fixed
Column Bracket
AS-H8



Adjustable
Column Bracket
AS-S9



1.2.1 **Fixed & Adjustable Column Brackets** – The top plate of the screw pile is predrilled with four 10mm mounting holes for the supporting bolts. Fasten these bolts and associated washers as per the above diagram.

1.2.2 Repeat the above steps for all remaining screw piles and check measurements to ensure your alignment is correct.

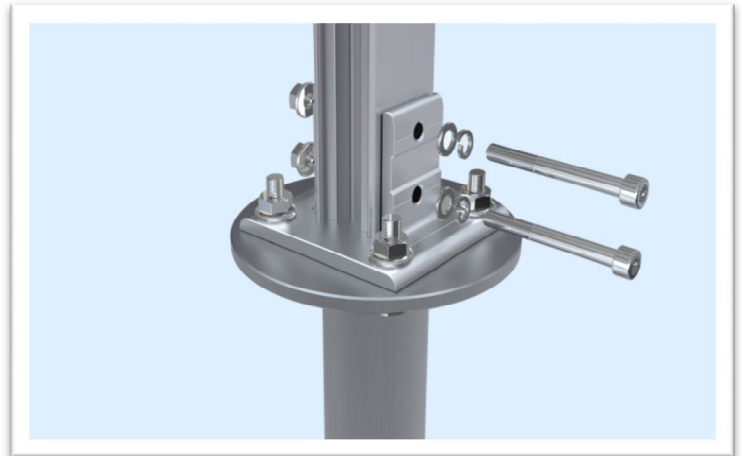
1.3 Installation Step 3 – Column and Connecting Nodes

>> *Tip: Consider the loose preassembly of the columns and beam rails into free standing frames before installing onto the column brackets that are anchored onto the foundations. Once all the loosely connected free standing frames are screwed onto the column brackets, you may still make any necessary adjustments before securing the structure.*

The following steps provide an overview into the installation of the columns and connecting nodes in preparation of the rail superstructure.

- 1.3.1 **Fixed Column Bracket** – With the column mounting brackets in place, the structural columns can be inserted into the mounting brackets and fastened. Align the mounting holes of the column with the ground bracket and insert the two fastening bolts. Check the orientation and level of the column with a spirit level before fastening the two bolts.

Fixed
Column Bracket
AS-H8



- 1.3.2 **Adjustable Column Bracket** – Measure and mark your intended height of the column and attach one of the side fixing plates onto the column mounting bracket corresponding to the column's height and ensuring the teeth are correctly aligned.



Adjustable
Column Bracket
AS-S9

Lower the column into the bracket to this predetermined height and insert one of the two fastening bolts with the washer through the side fixing plate and column onto the other end where the second side fixing plate will need to be attached.

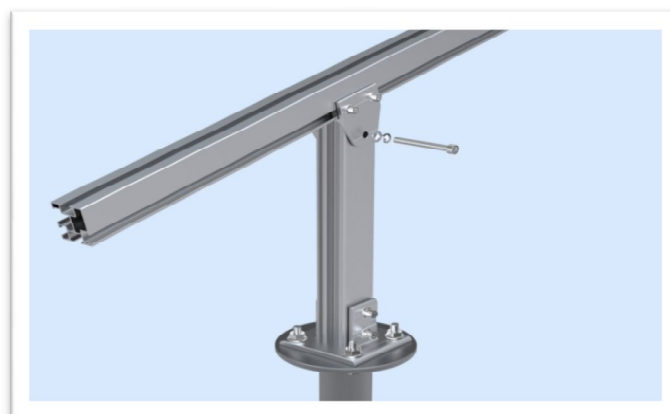
Loosely attach these together with the associated nut of the bolt. Upon checking the level and height measurements, insert the second bolt and fasten both nuts.

- 1.3.3 Repeat the above steps for second mounting position.

- 1.3.4 The connecting node must first be attached to the KR-M6 Beam Rail before mounting onto the columns. Slide the connecting node's anchor points into the KR-M6 Rail's dual slots as per the below diagram and fasten the two screw points to fix into position as per your plan.



- 1.3.5 The connecting node attaches to the columns via a pin jointed bolt as per the below diagram.



- 1.3.6 Connect both connecting joints to the associated columns to complete the first set of free standing frames.

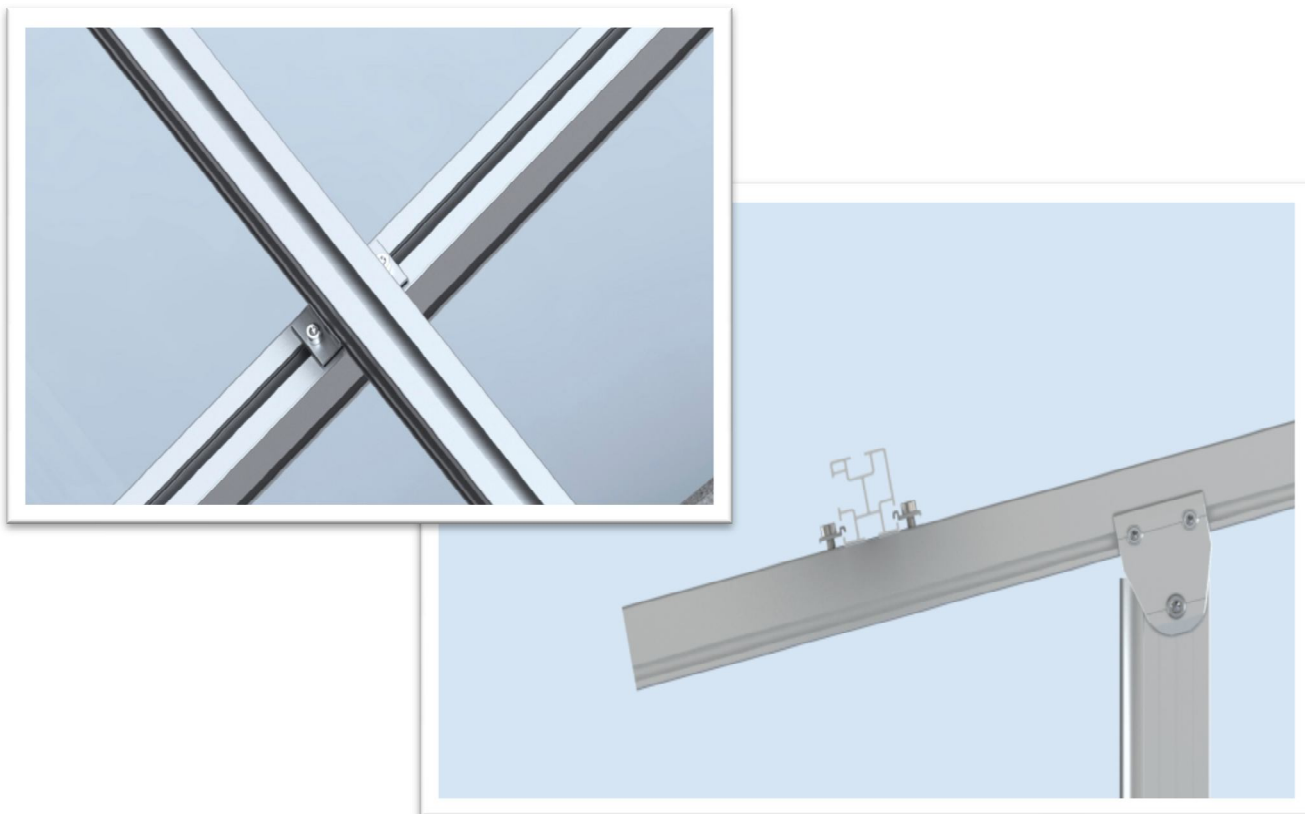


- 1.3.7 Repeat the above steps to complete all remaining free standing frames.

1.4 Installation Step 4 – Rail Superstructure

The KM-S Series utilises the KR-M6 Rail as the main component rail in mounting the associated solar panels as well as being used as its beam rails. At every point where these rails intersect, two rail intersection clamps will need to be installed, linking the panel mounting rails with the beams.

- 1.4.1 A pair of KR-M6 rails is required for each row of PV panels. The KM-S series is designed to support four parallel KR-M6 rails, or two rows of PV panels. At each of the intersections between the two rails, two intersection clamps (RC-S4) are required.
- 1.4.2 Repeat this step for all intersections and ensure the clamps are flush fit when tightened.

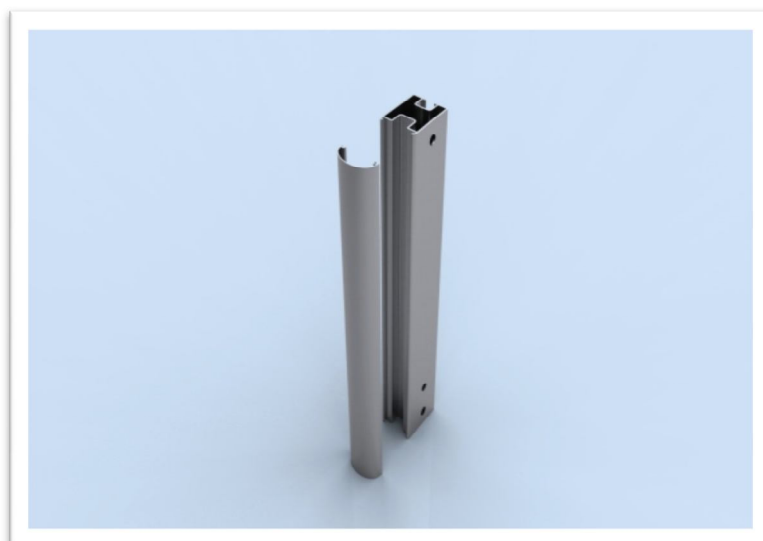


- 1.4.3 Your main super structure should now be complete and ready for panel mounting.

1.5 *In cases where an extended rail length is used, please refer to page 26 for the installation of a splice connector.*

1.6 *Please refer to Page 27 for panel mounting onto KR-M6 rails.*

The AL-50 structural column features a removal cover for the running of any necessary electrical cabling to the ground.

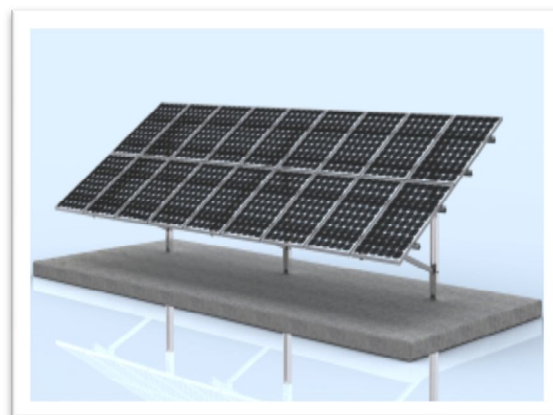


E. KM-D Series - Driven Foundations

The KM-D series of KNE's Racking Systems is based on driven foundations ideal for open fields and paddocks. This particular foundation relies on the shear strength of the soil below to ensure stability above. Like the Ground Based Screw in System, the KM-D series provides a quick alternate solution to concreting where applicable.

Specifications

KM-D Series - Driven Foundations	
Installation Type	Ground Fixed (Driven Pile)
PV Panel Type	Framed / Frameless
Panel Orientation	Portrait Orientation
Design Wind Speed	42 m/s (151km/h or 94 mph)
Design Snow Speed	0.735 kN/m ²
Material Type	Aluminium Alloys, Galvanised Steel
Warranty	15 Years Structural Warranty
Approved Standards	AS/NZS 1170, USA, European Standards
Surface Finish	AMMA, ASCA and BS Standards

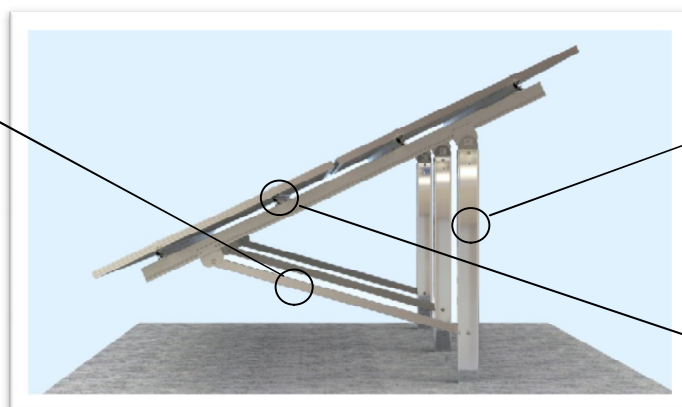


System Components

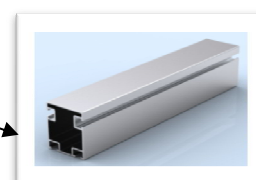
Rails and Column Brackets



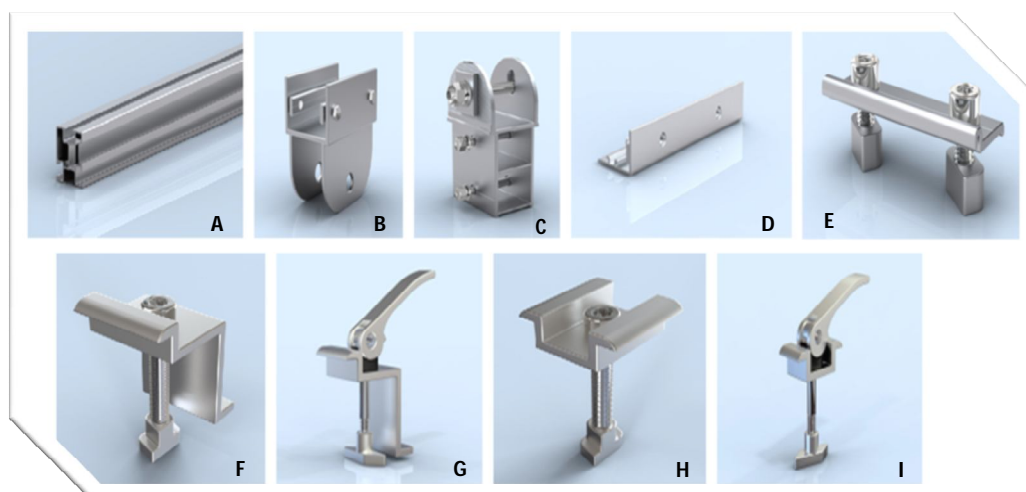
Cross Brace Member
SL-S3/S4



Driven Foundation Column
SL-4/6/8



Reinforced Beam Rail
KR-F10



Associated Rail Components

- A - Racking Rail KR-M6
- B - Beam to Cross Brace Node LC-R20
- C - Column Connecting Node LC-H16
- D - Splice Connector SC-R5
- E - Rail Intersection Clamp SC-S8
- F - Version 1 End Clamp
- G - Version 2 Quick Mount End Clamp
- H - Version 1 Mid Clamp
- I - Version 2 Quick Mount Mid Clamp

Installation – KM-D Series

Overview:

Prior to the installation of the racking system, please ensure you have planned out the correct areas and location of the intended solar PV installation and that all measurements are as per your original plan. KNE's KM-D Series is based on the use of driven piles as foundations and must be installed into the ground with the use of the correct driving attachments. The installation of the KM-D Series will be conducted with the following steps:

1. Pile Driving
2. Connecting Nodes
3. Rail Superstructure
4. Splice Connection
5. Panel Mounting

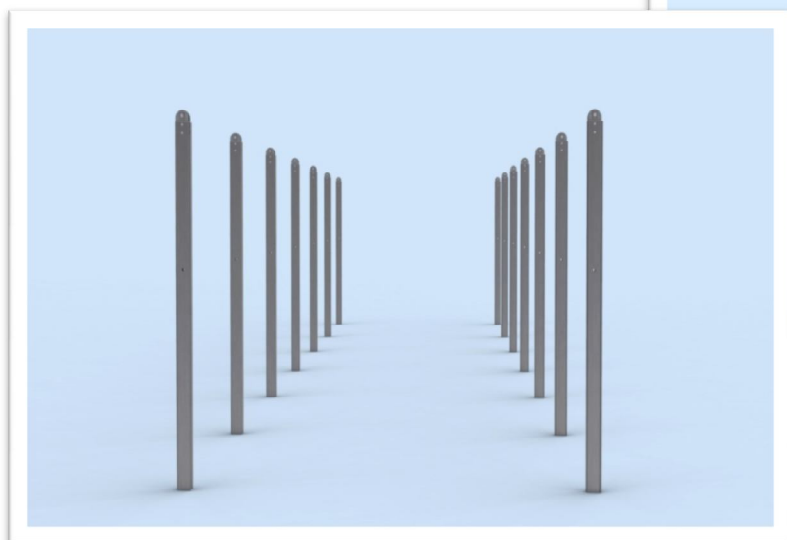
1.1 Installation Step 1 – Pile Driving

- 1.1.1 Prior to the installation of the piles, you must have plan of your intended locations of the driven piles marked out in your field/assigned area. You must also ensure your piling contractor is a qualified operator of the necessary drilling/excavator machinery. *Refer to About Foundations part of the installation guide, page 1.*
- 1.1.2 At the marked locations, drive the piles into ground as per your plan of depths.
- 1.1.3 Complete the remainder of your proposed piles as per your plan.

1.2 Installation Step 2 – Connecting Nodes

>> *Tip: Consider the loose preassembly of the columns and beam rails into free standing frames before installing onto the column brackets that are anchored onto the foundations. Once all the loosely connected free standing frames are screwed onto the column brackets, you may still make any necessary adjustments before securing the structure.*

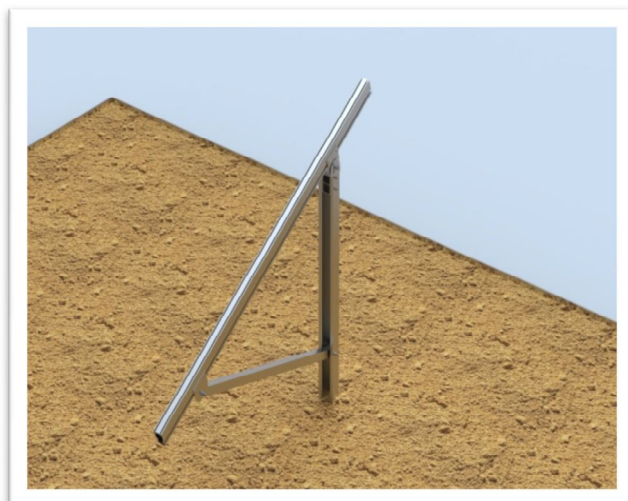
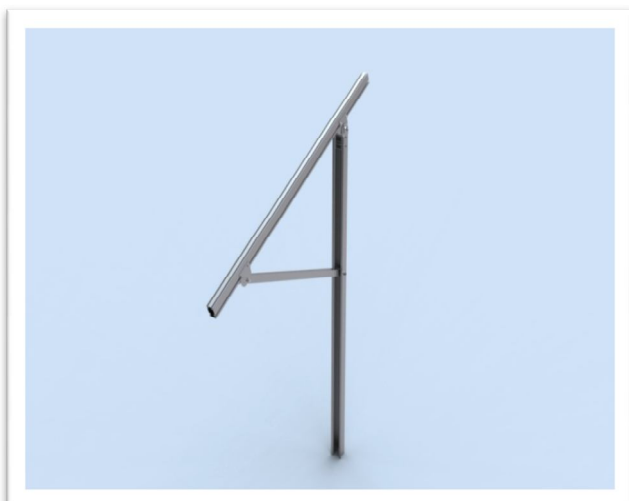
- 1.2.1 The following procedures involve securing the driven foundation column (SL-4/6/8) to its associated connecting node, LC-H16.
- 1.2.2 Repeat the above step so that all remain pile columns on site have their associated connecting nodes attached and fastened.



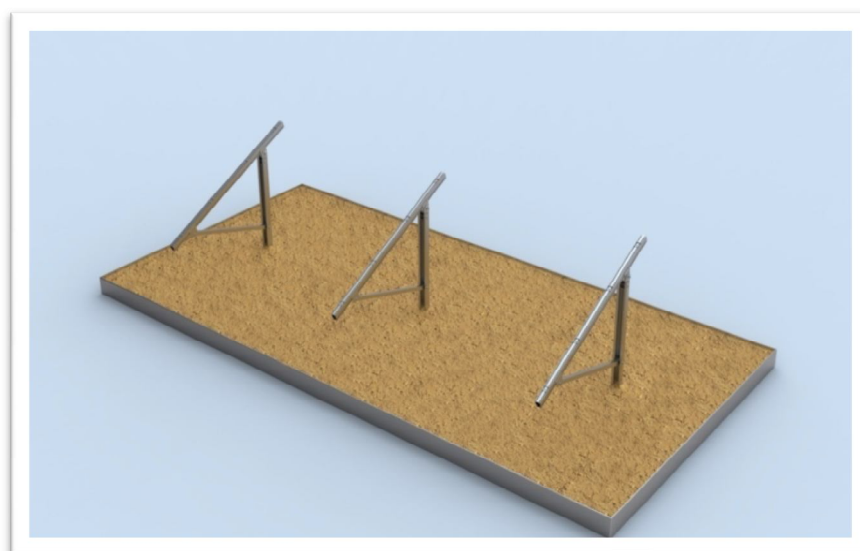
- 1.2.3 Separate from the installed column, assemble the reinforced beam rail KR-F10 and its connecting node LC-R20, with the cross brace SL-S3/S4.



- 1.2.4 Attach this three piece component onto the top of the pile column, fixing it to the connecting node, LC-H16. The cross brace is also secured to the pile column.



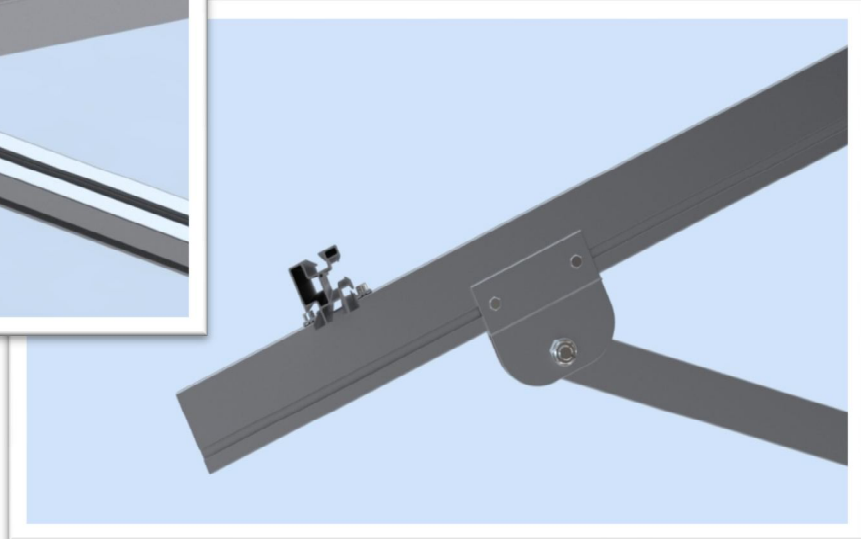
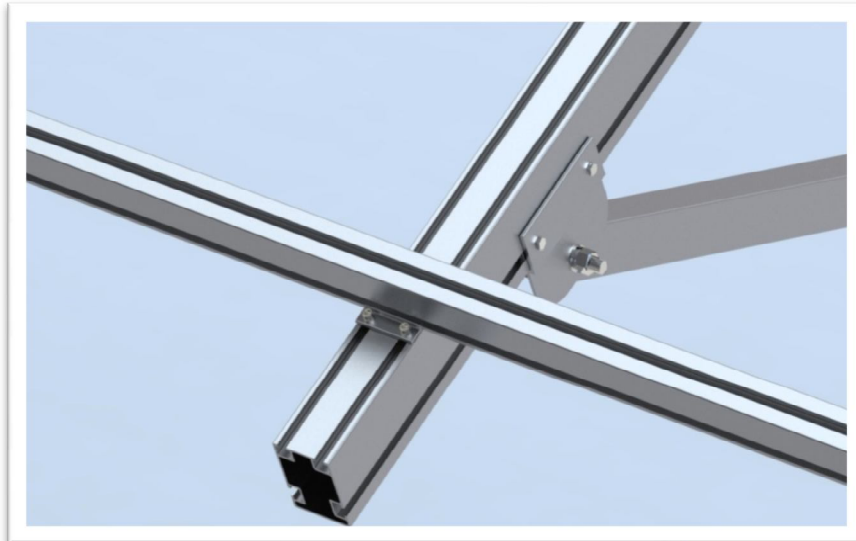
- 1.2.5 Repeat the above steps for all remaining columns.



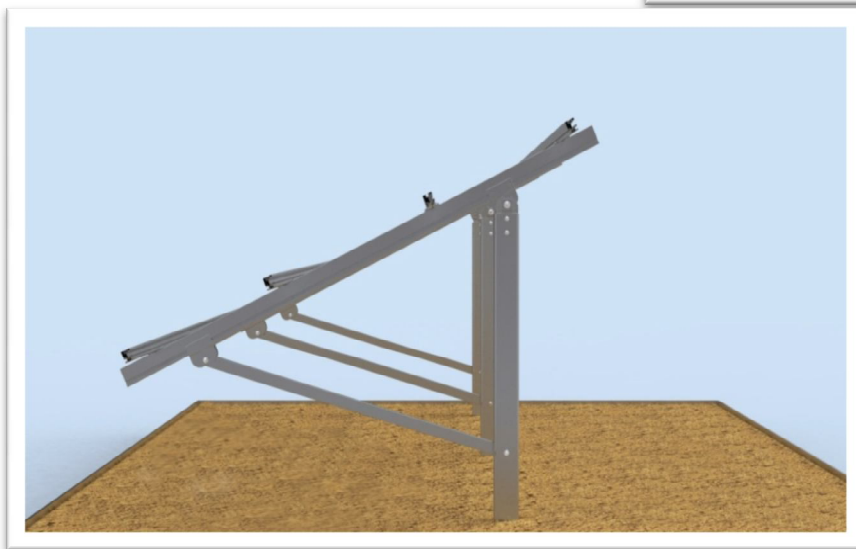
1.3 Installation Step 3 – Rail Superstructure

The KM-D Series utilises the KR-M6 Rail as the main component rail in mounting the associated solar panels. These KR-M6 rail lengths are in turn connected to the KR-F10 beam rails which are connected to the pile columns. Connecting the KR-M6 and KR-F10 rails will be the Rail Intersection Clamp SC-S8. At every point where these rails intersect, two rail intersection clamps will need to be installed, linking the panel mounting rails with the beams.

- 1.3.1 A pair of KR-M6 rails is required for each row of PV panels. The KM-D series is designed to support four parallel KR-M6 rails, or two rows of PV panels. At each of the intersections between the two rails, two intersection clamps (SC-S8) are required.
- 1.3.2 Repeat this step for all intersections and ensure the clamps are flush fit when tightened.



- 1.3.3 Your main super structure should now be complete and ready for panel mounting.



1.4 In cases where an extended rail length is used, please refer to page 26 for the installation of a splice connector.

1.5 Please refer to Page 27 for panel mounting onto KR-M6 rails.

F. KM-RF, NRF, W – Triangular Tilt Frame Systems

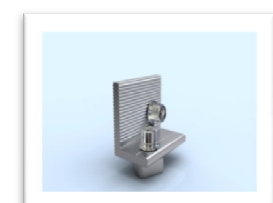
KNE's Triangular Racking Systems are designed with flexibility in mind, the KM-RF and KM-NRF series of KNE flat ground systems are suitable for flat roofs or ground fixing. The simple design provides a lightweight yet strong and stiff structure capable of weathering the elements. The simple nature of the structure allows many of the components to be prefabricated off site and brought in preassembled, minimizing onsite installation time. The KM-RF is also available in a ballast variation (KM-W).

Specifications

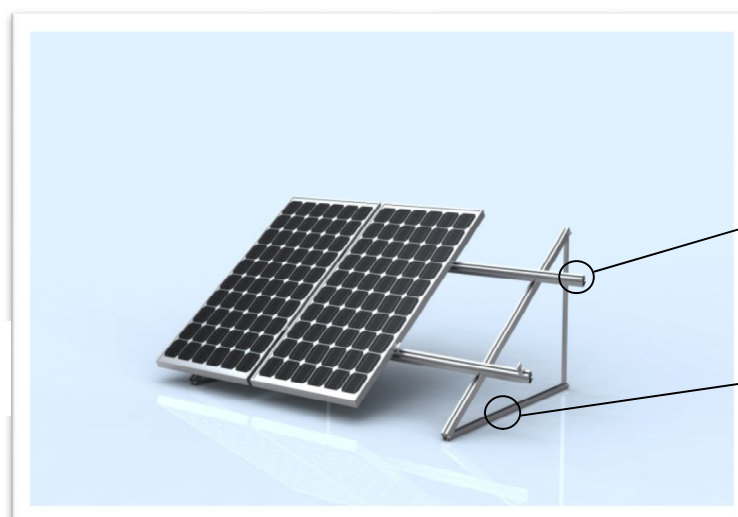
KM-RF Series – Triangular Tilt Frame System I and KM-W Series – Ballast Foundation System	
Installation Type	Ground Fixed (Bolting)
PV Panel Type	Framed / Frameless
Panel Orientation	Portrait Orientation
Design Wind Speed	42 m/s (151km/h or 94 mph)
Design Snow Speed	0.735 kN/m ²
Material Type	Aluminium Alloys
Warranty	15 Years Structural Warranty
Approved Standards	AS/NZS 1170, USA, European Standards
Surface Finish	AMMA, ASCA and BS Standards

System Components

KM-RF/KM-W System Components



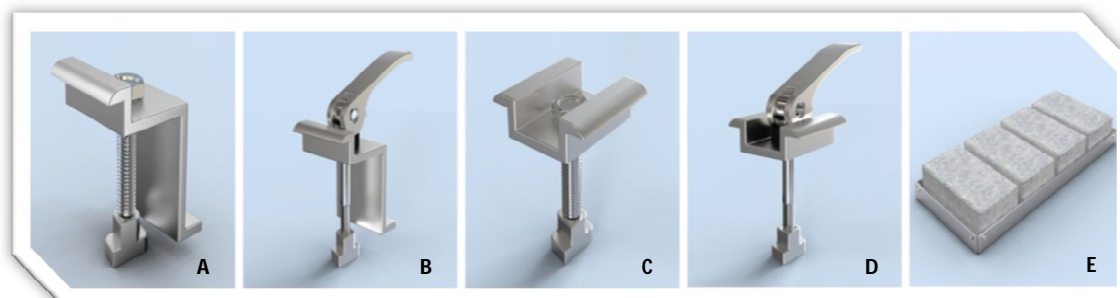
Rail Intersection Clamp
RC-L20



Mounting Rail & Connecting
Splice KR-M5 & SC-H9



Fixed Angle Tilt Frame
RF-10/20/30



- A - Version 1 End Clamp
- B - Version 2 Quick Mount End Clamp
- C - Version 1 Mid Clamp
- D - Version 2 Quick Mount Mid Clamp
- E - Ballast Tray KLB-12

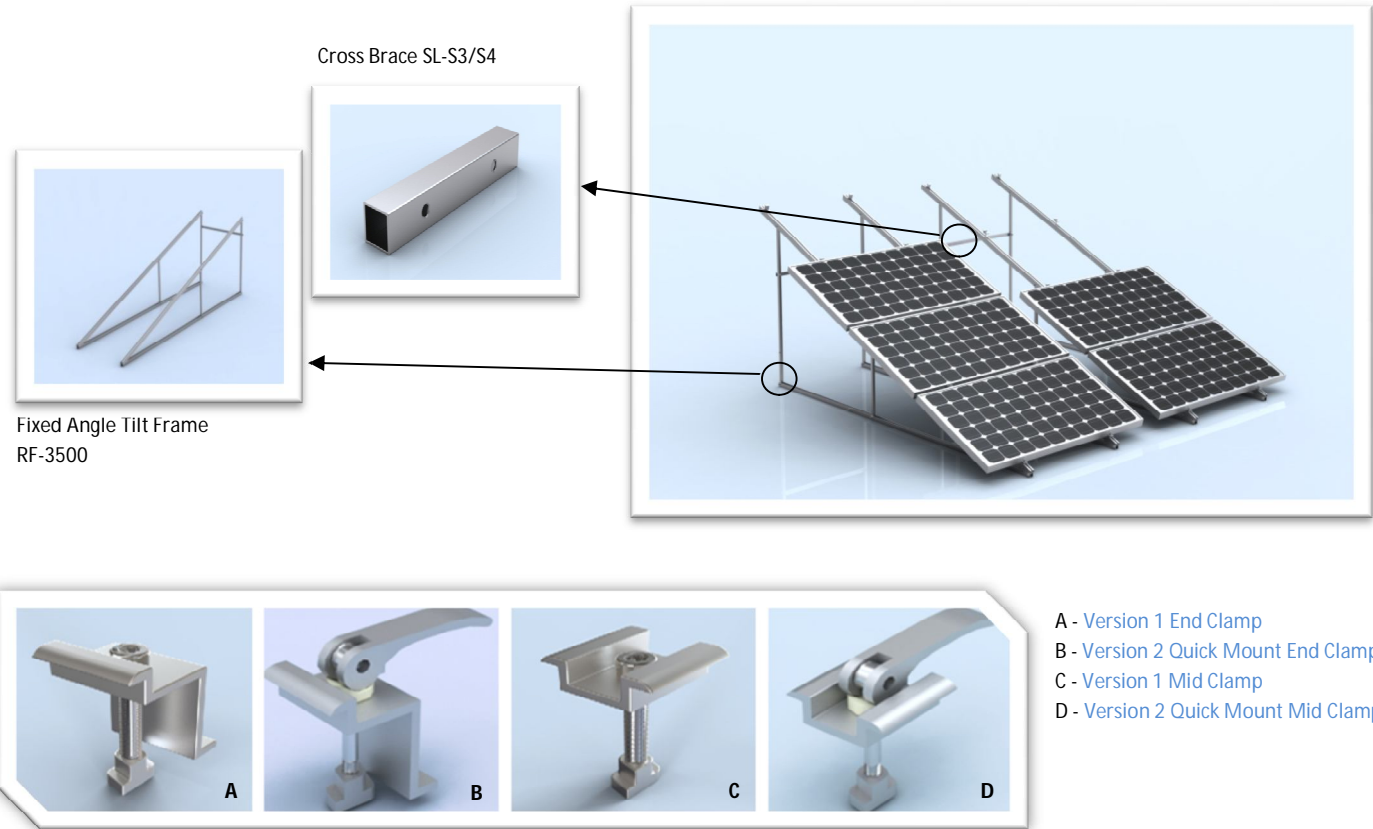
The KM-NRF Series Triangular Tilt Frame System II allows for the landscape installation of solar panels, also using the triangular frame as a rail itself. The simple design provides a lightweight yet strong and stiff structure capable of weathering the elements. The simple nature of the structure allows many of the components to be prefabricated off site and brought in preassembled, minimizing onsite installation time.

Specifications

KM-NRF Series - Triangular Tilt Frame System II	
Installation Type	Ground Fixed (Bolting)
PV Panel Type	Framed / Frameless
Panel Orientation	Landscape Orientation
Design Wind Speed	42 m/s (151km/h or 94 mph)
Design Snow Speed	0.735 kN/m ²
Material Type	Aluminium Alloys
Warranty	15 Years Structural Warranty
Approved Standards	AS/NZS 1170, USA, European Standards
Surface Finish	AMMA, ASCA and BS Standards

System Components

KM-NRF System Components



Installation – KM-RF / NRF & KM-W Series

Overview:

The KM-RF/NRF & KM-W Series are a rapid assembly triangular tilt frame solution which allows for offsite prefabrication and easy transportation. The installation of these series will be conducted with the following steps:

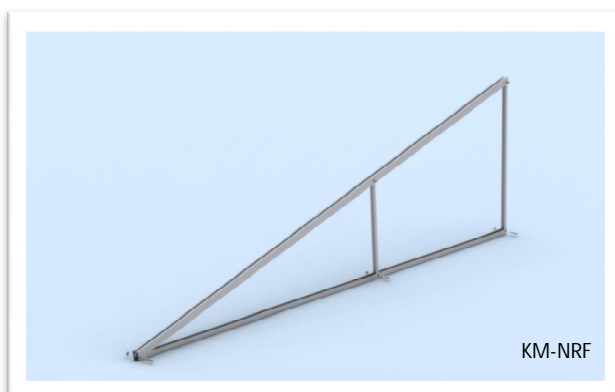
1. Triangular Frame Assembly
2. Ground Fixing
3. Rail Installation
4. Ballast Tray Mounting
5. Splice Connection
6. Panel Mounting

1.1 Installation Step 1 – Triangular Frame Assembly

The KM-RF/KM-W and KM-NRF series are designed to be deployed on site in a quick and systematic manner which allows for offsite prefabrication, however it is still required that a plan be established in relation to the position of the triangular frames on site. When bolting onto the ground, a visual inspection of the concrete will need to be made to ensure there isn't any cracking that may jeopardize long term useability.

- 1.1.1 **[KM-RF / KM-W]** – The fixed angle tilt frame (RF-10/20/30) is a three rail design secured together via three bolts as per the below the diagram.

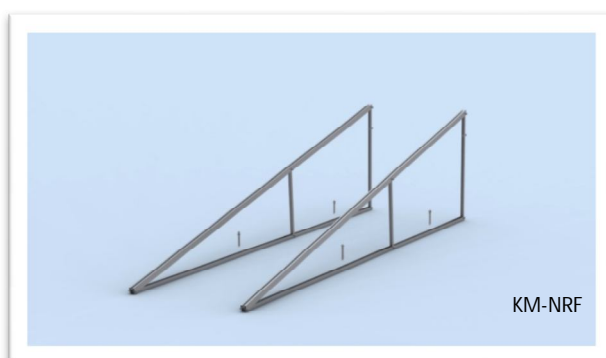
[KM-NRF] – The rail-less fixed angle tilt frame (RF-3500) is a two arm design, secured upright via two vertical support braces. Four bolts will need to be fastened here.



- 1.1.2 Assemble all the triangular frames as per your design plan.

1.2 Installation Step 2 – Ground Fixing

- 1.2.1 **[KM-RF / KM-NRF]** – The KM-RF and KM-NRF are both fastened and secured to the ground with the use of 10 mm anchor bolts. Within the triangular frames of both series, predrilled holes for these bolts can be found. Using a rotary hammer, drill these holes and secure the frames to the ground.



[KM-NRF] – The KM-NRF Series features a cross brace (SL-S3/S4) fastened between each of the triangular frames via two bolts allowing the frames to stand upright.



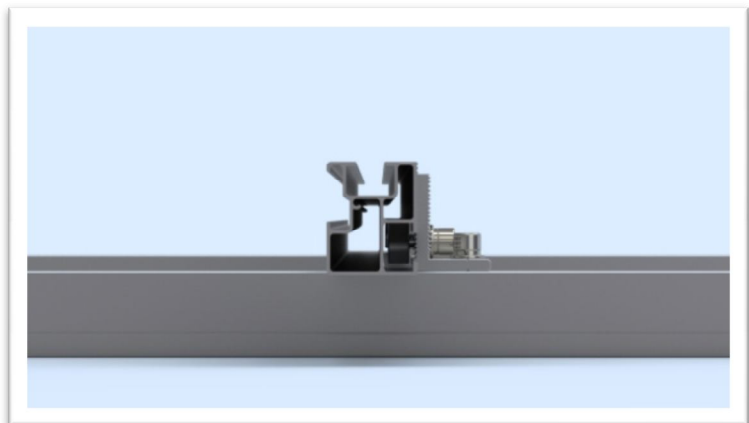
1.3 Installation Step 3 – Rail Mounting

- 1.3.1 [KM-RF / KM-W] – The associated rail to be installed here is the KR-M5 in conjunction with the rail intersection clamp RC-L20. Two parallel KR-M5 rails will need to be placed and arranged according to your design plan. At each of the intersections between the triangular frame and KR-M5 rails, an intersection clamp (RC-L20) will be required.

[KM-NRF] – This is a rail-less design, hence please proceed to the following installation process of panel mounting.

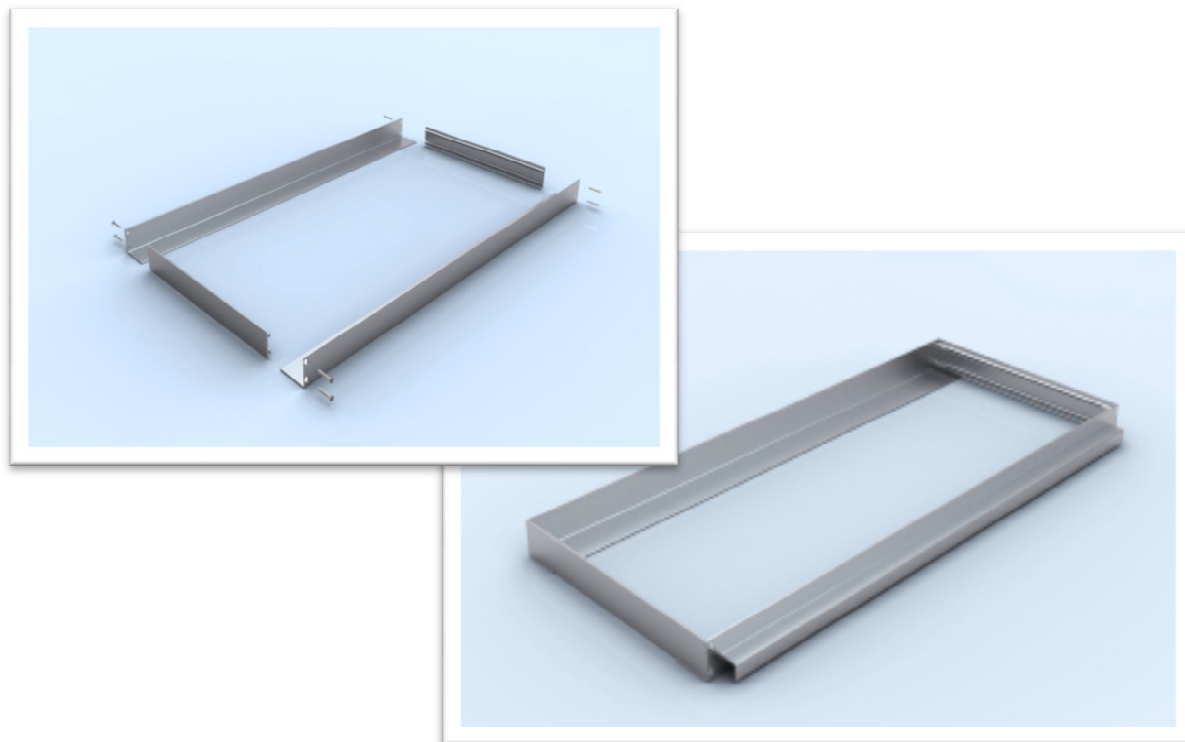


- 1.3.2 [KM-RF / KM-W] – Repeat this step for all intersections and ensure the clamps are flush fit when tightened.

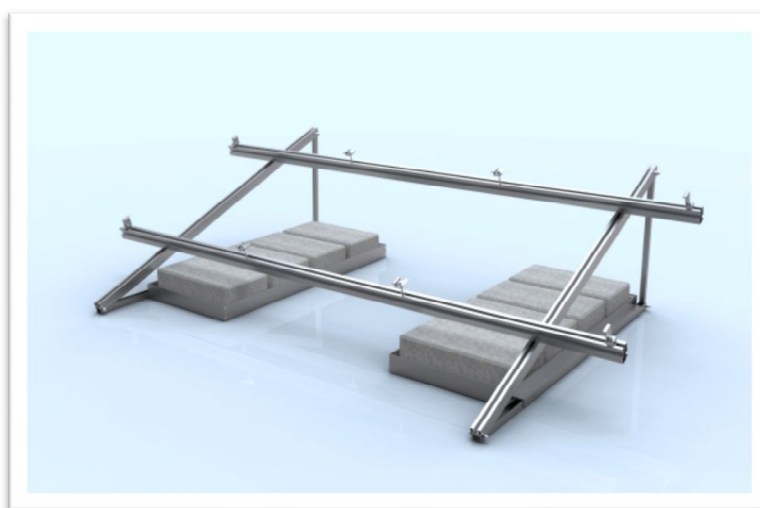


1.4 Installation Step 4 – Ballast Tray Mounting

[KM-W] – The KM-W Series requires the assembly of the ballast tray (KLB-12), which is comprised of four main channels that are fixed together on the corner joints.

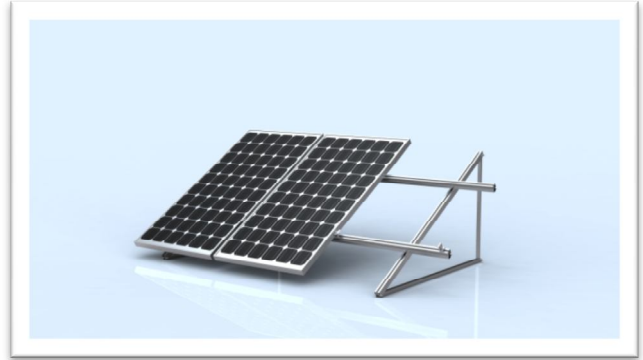
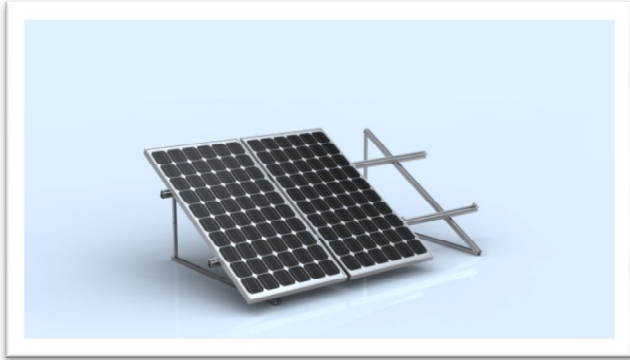


- 1.4.1 [KM-W] – The ballast tray features a latching channel on one of its sides and this is design to clip onto the triangular tilt frame, after which the ballast blocks can be placed into the tray.

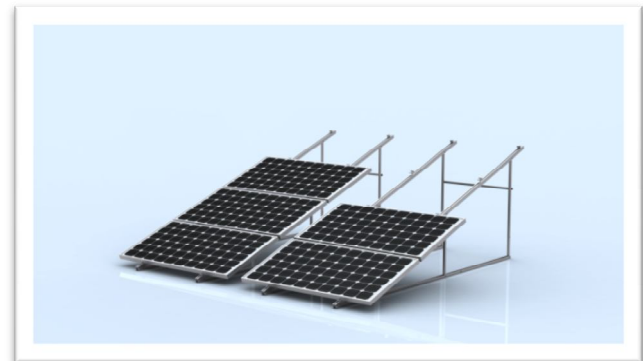
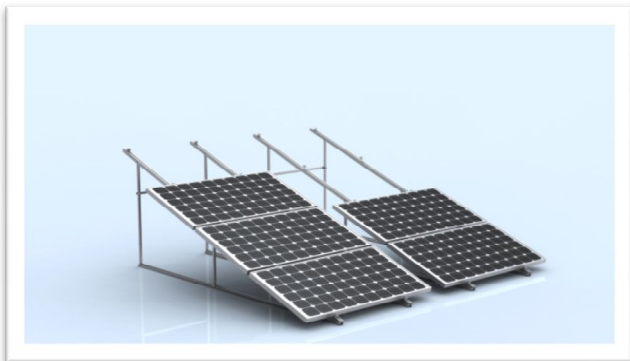


- 1.5 [KM-RF / KM-W] - In cases of long rail lengths, a rail connection splice will need to be installed. Please refer to page 26 for the installation of a splice connector and page 27 for panel mounting.

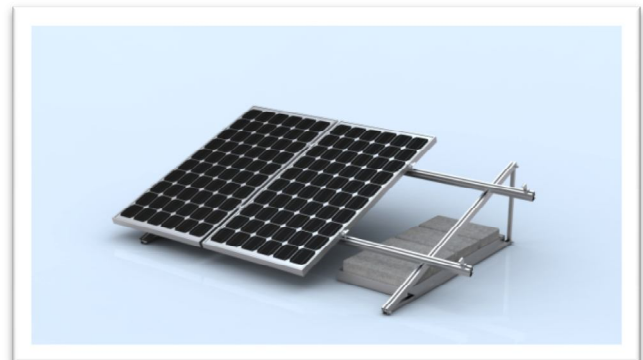
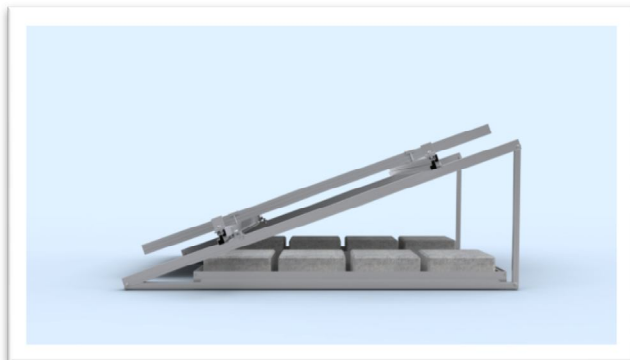
- 1.6 [KM-NRF] – The KM-NRF Series is a rail-less design, proceed to page 27 for panel mounting.



KM-RF – Triangular Tilt Frame System (Ground Mounted)



KM-NRF – Rail-less Triangular Tilt Frame System (Ground Mounted)



KM-W – Triangular Tilt Frame System (Ballast Mounted)

G. Splice Connection and Panel Mounting

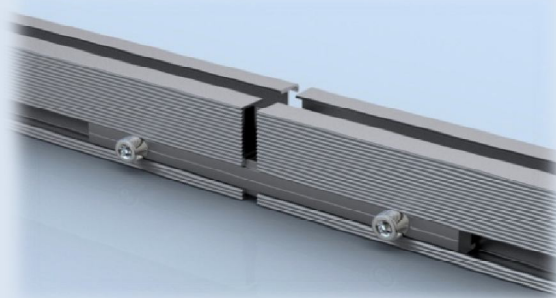
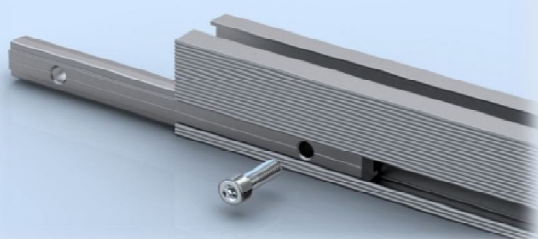
Splice Connection

Installation on KR-M5 & KR-M6 Rails

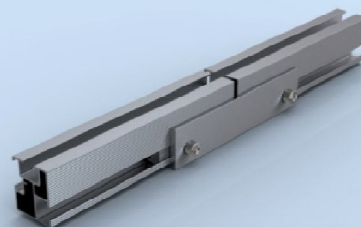
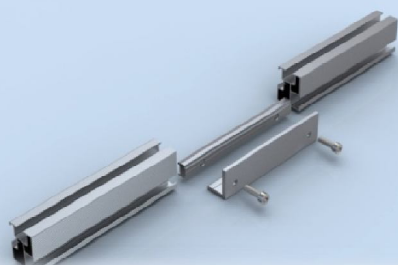
In cases requiring longer rail lengths, a rail connection splice can be installed. The following steps will advise the splice connection of rails KR-M5 and KR-M6, applicable to all KNE ground mounting systems.

1. Align the connection splice with one end of the mounting rail.
2. Secure the splice with the associated fastener.
3. Slide the mounting rail extension to the connection splice, leave an expansion gap of at least 10 mm and secure this extension with the associated fastener.

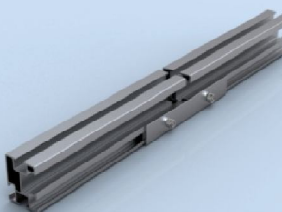
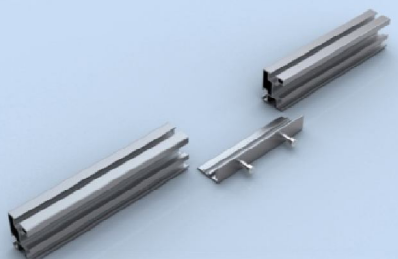
SC-H9
(KR-M5 rail)



SC-R19
(KR-M5 rail)



SC-R5
(KR-M6 rail)



Panel Mounting

Installation of Mid & End Clamps (KR-M5 Rail)

All clamps can come with different types of fastening nuts other than illustrated and can be used on various models of KNE rails.

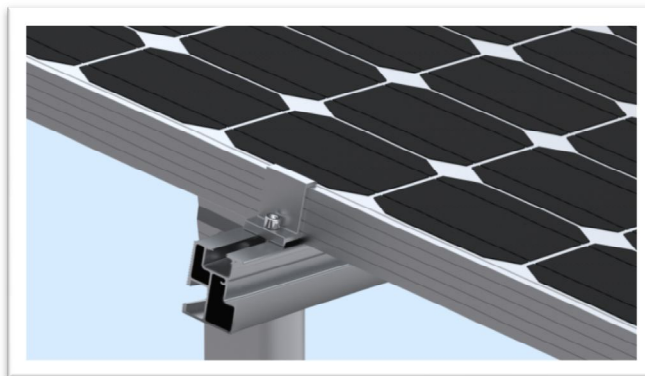
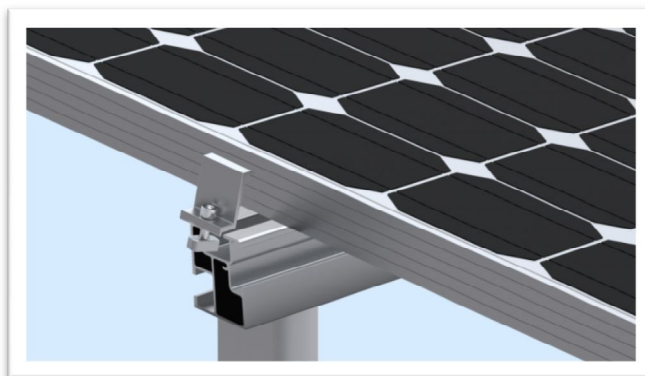


Mid Clamps (LTR): Version 1 & Version 2

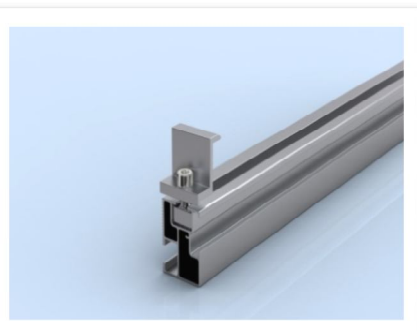
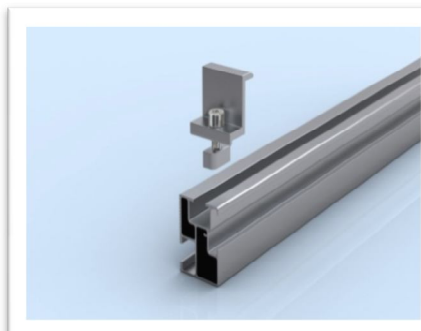


End Clamps (LTR): Version 1 & Version 2

1. With the mounting rail now in position and tightly secured, place and align the PV panel on top of the rail at the assigned position.
2. Secure the panel down with the associated end clamps. This process involves inserting the anchor end of the end clamp into the mounting rail channel and twisting the anchor so that it locks onto the rail when tightened.



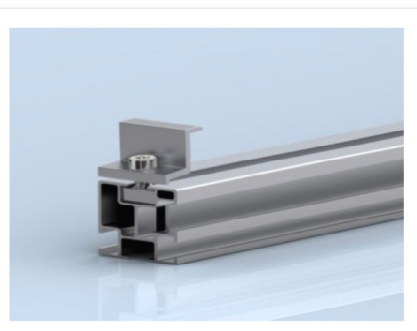
3. **END CLAMP** – The securing and fastening of an end clamp is a three step simple process of (1) inserting the anchor nut, (2) rotating and (3) fastening. Please see below for further details.



Shown above with mounting rail KR-M5

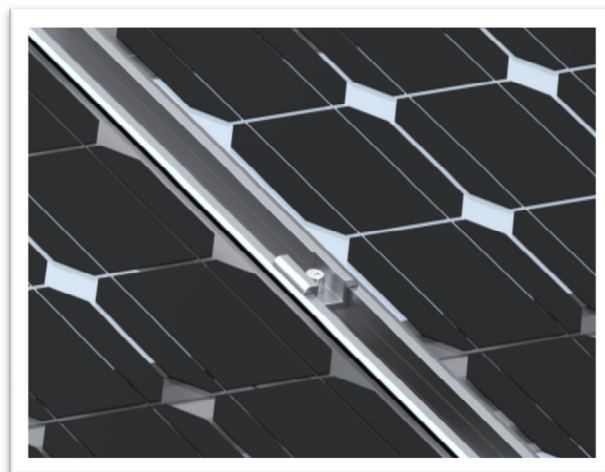
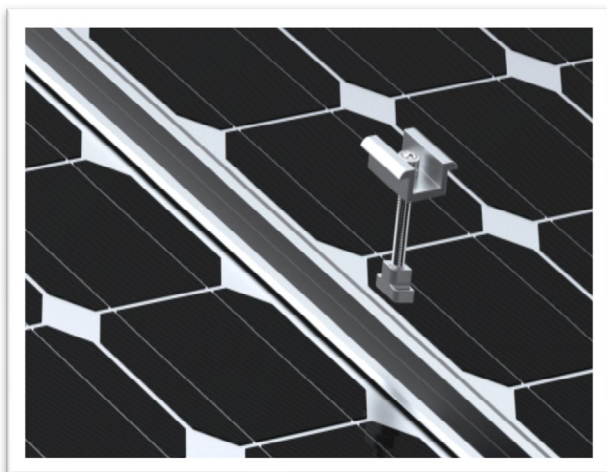
Most end clamps are installed as follows:

1. Ensure the locking anchor nut has been threaded in sufficiently.
2. Insert the anchor into the top rail channel and twist to rotate the nut.
3. Once in the correct position, tighten fastener.

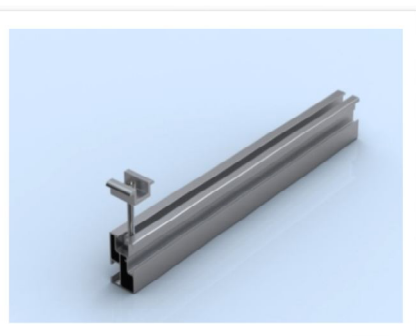


Shown above with mounting rail KR-M6

4. Place down the adjacent panel and ensure it aligns with the existing panel already mounted.
5. Secure this new panel with the mid clamp attachment. This process is done similarly with the end clamp and involves inserting the anchor end into the mounting rail channel, twisting the anchor and tightening the nut.



6. **MID CLAMP**-The securing and fastening of a mid clamp is a three step simple process of (1) inserting the anchor nut, (2) rotating and (3) fastening. Please see below for further details.



Shown above with mounting rail KR-M5

Most mid clamps are installed as follows:

1. Ensure the locking anchor nut has been threaded in sufficiently.
2. Insert the anchor into the top rail channel and twist to rotate the nut.
3. Once in the correct position, tighten fastener.



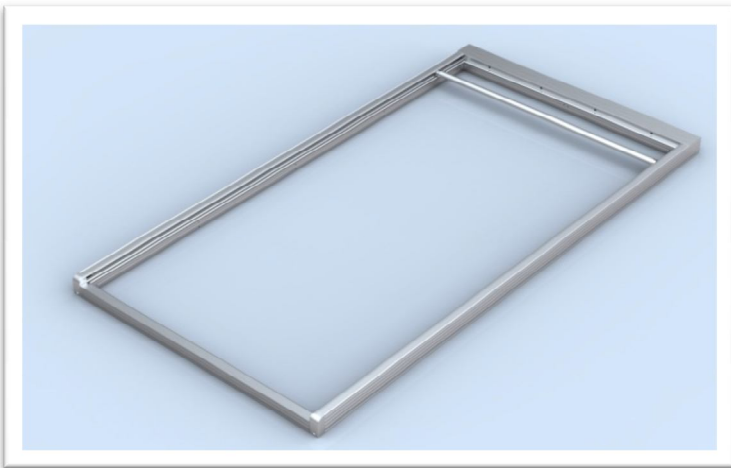
Shown above with mounting rail KR-M6

7. Continue this process of laying down each of the panels until the end of rail where it is then secured with another set of end clamps.

H. General Information

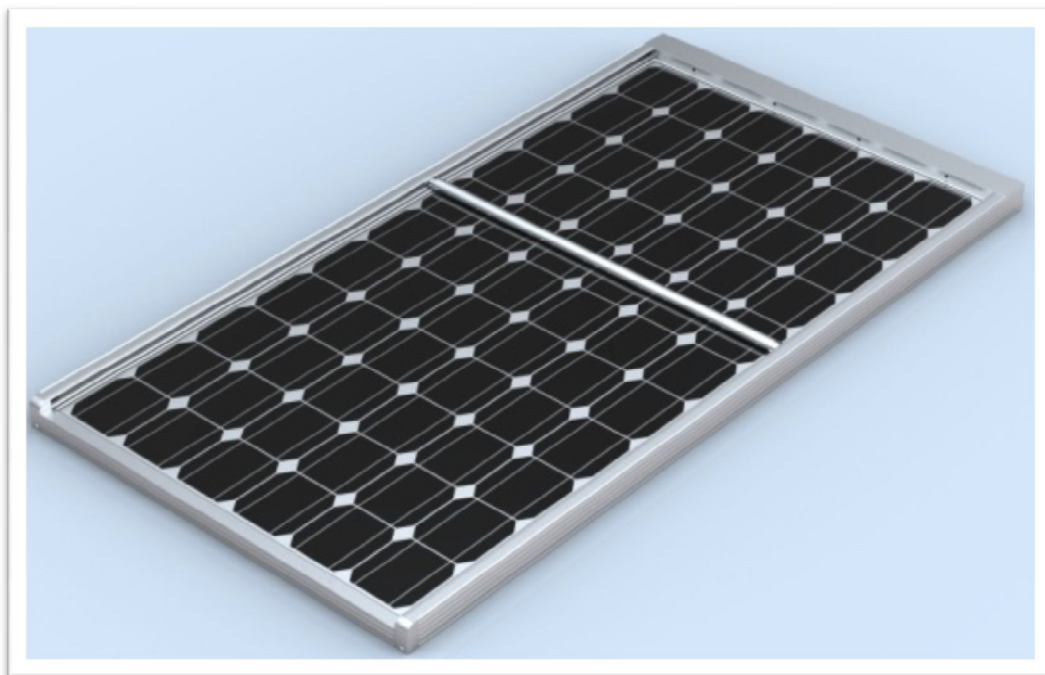
Maintenance

KNE's racking systems are a near maintenance free innovation, designed and built to last in most conditions. Your solar panels' surfaces should be maintained free of debris in order to maintain efficiency.



Consider upgrading your solar system with KNE's Automatic Cleaning System to help maintain the effective output of solar PV systems. The KNE Automatic Cleaning System is an innovation geared towards keeping your solar panels clean without the hard work.

The KNE Automatic Cleaning System can be installed onto your solar panels and utilizes a spray jet and traversing arm to mechanically clean your photovoltaic panels with a touch of a button and can be programmed to clean your solar panels automatically at regular intervals. In addition, the Automatic Cleaning System is designed to work with all KNE rack and mounting systems.



The KNE Automatic Cleaning System is a highly intelligent automated cleaning system engineered to keep your solar PV system operating at its potential by cleaning away the inevitable accumulation of dust, dirt, snow and other material which ultimately affects the overall output of the solar panels over time.

Limited Warranty

KNE takes pride in ensuring our products are compliant and engineered to last with quality materials and impeccable workmanship through outstanding manufacturing processes. KNE warrants our products to be free of defects in material and workmanship and provides the following warranty periods from the date of purchase:

Solar Panel Mounting Rails: 15 Years

Clamping Components: 15 Years

Mounting Brackets: 15 Years

Within these periods we will repair or replace free of charge any of our products that proved to be defective on inspection by us or by an authorized service representative. This warranty does not cover claims for damage due to abuse, neglect, alteration, improper installation or attempted to repair by unauthorized personnel, and is limited to failures of defects in material or workmanship of the product.

Liability

Since observation of these installation instructions, the conditions and methods of installation, operation, use and maintenance of KNE's Mounting Systems is not monitored by KNE, KNE accepts no liability for damage arising through improper use or incorrect installation, operation, use or maintenance. Moreover, KNE assumes no liability when KNE, its representatives or agents are accused of gross negligence or intent. KNE assumes no liability for infringements of patent law or third party rights arising from the use of the modules and the mounting system.



King's New Energy Co., Ltd.

Shangchong Street, Tanjiang Avenue, Dajiang Town

Taishan City, Guangdong Province, P.R.C.

Tel: + 86 750 5560033

Fax: + 86 750 5509969

www.knesolar.com

info@knesolar.com